National Aeronautics and Space Administration

NASA's Exploration Program

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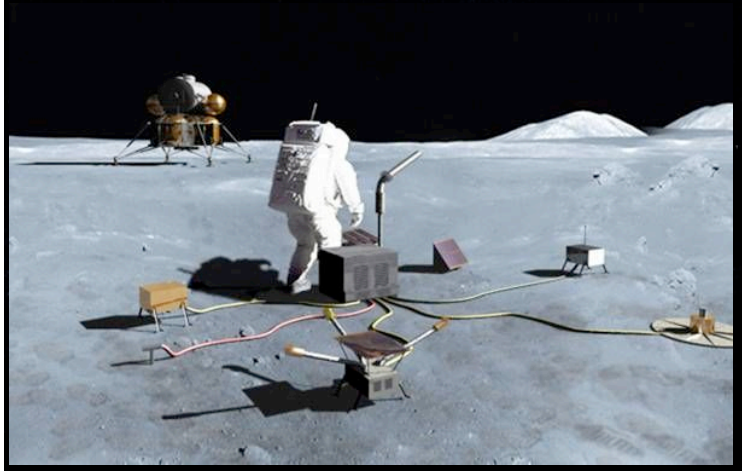
www.nasa.gov

Space Exploration Direction, Authorized by Congress

- Complete the International Space Station
- Safely fly the Space Shuttle until 2010
- Develop and fly the Crew Exploration Vehicle no later than 2014
- Return to the Moon no later than 2020
- Extend human presence across the solar system and beyond
- Implement a sustained and affordable human and robotic program
- Develop supporting innovative technologies, knowledge, and infrastructures
- Promote international and commercial participation in exploration



NASA Authorization Act of 2005

The Administrator shall establish a program to develop a sustained human presence on the Moon, including a robust precursor program to promote exploration, science, commerce and U.S. preeminence in space, and as a stepping stone to future exploration of Mars and other destinations.

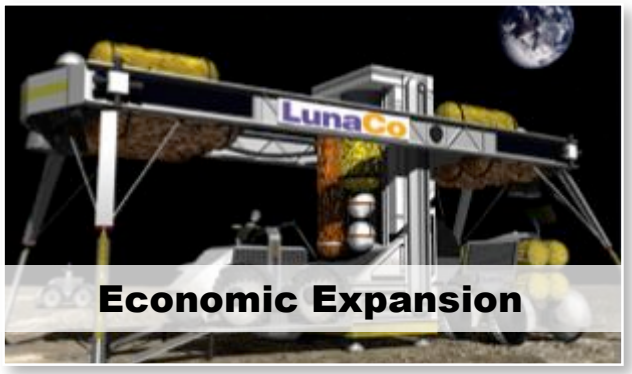
Why explore the Moon?

Human Civilization

Scientific Knowledge

Exploration Preparation

Global Partnerships



Economic Expansion

Public Engagement

Exploration Roadmap

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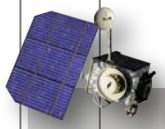
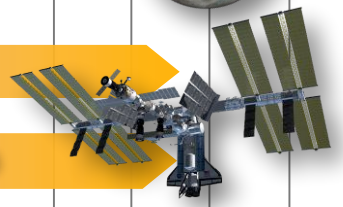


Exploration and Science Lunar Robotics Missions

Lunar Outpost Buildup

Research and Technology Development on ISS



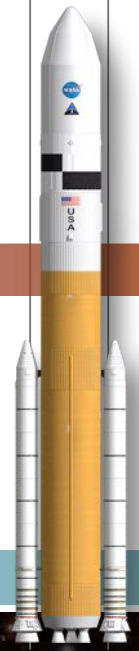
Commercial Orbital Transportation Services for ISS

Space Shuttle Operations

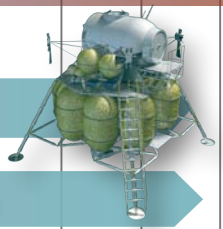
Space Shuttle Program
Transition and Retirement

Ares I and Orion Development

Operations Capability Development
(EVA Systems, Ground Operations, Mission Operations)



Orion and Ares I Production and Operation

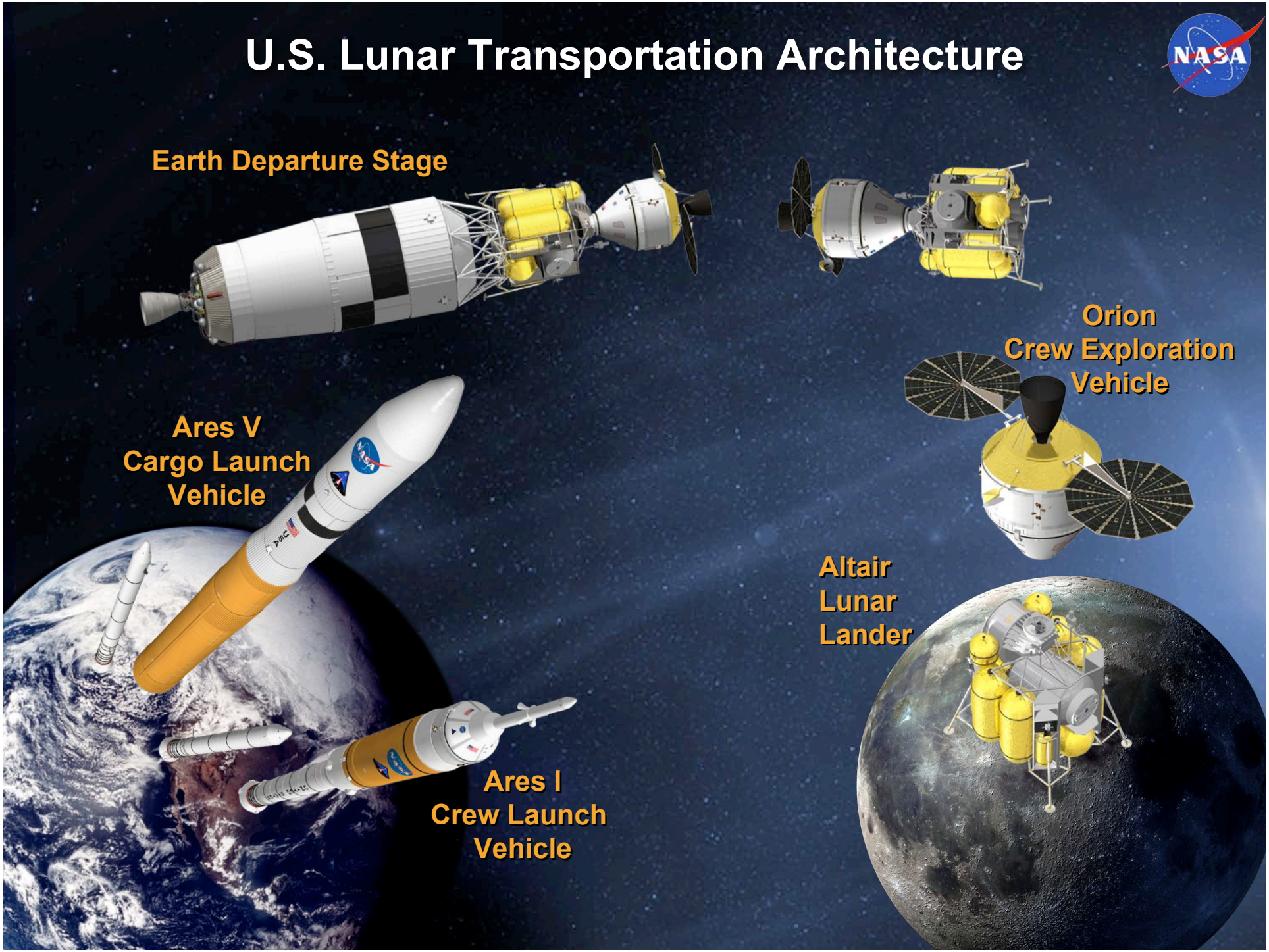


Altair Lunar Lander Development

Ares V and Earth Departure Stage

Surface Systems Development

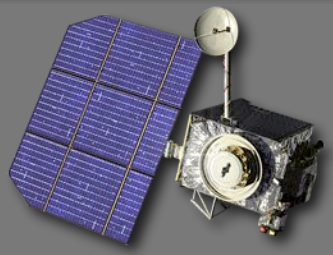
U.S. Lunar Transportation Architecture

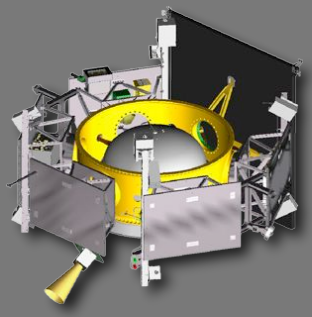


NASA Programs Enabling Exploration

Advanced Capabilities Division (ACD)

Lunar Precursor Robotic Program





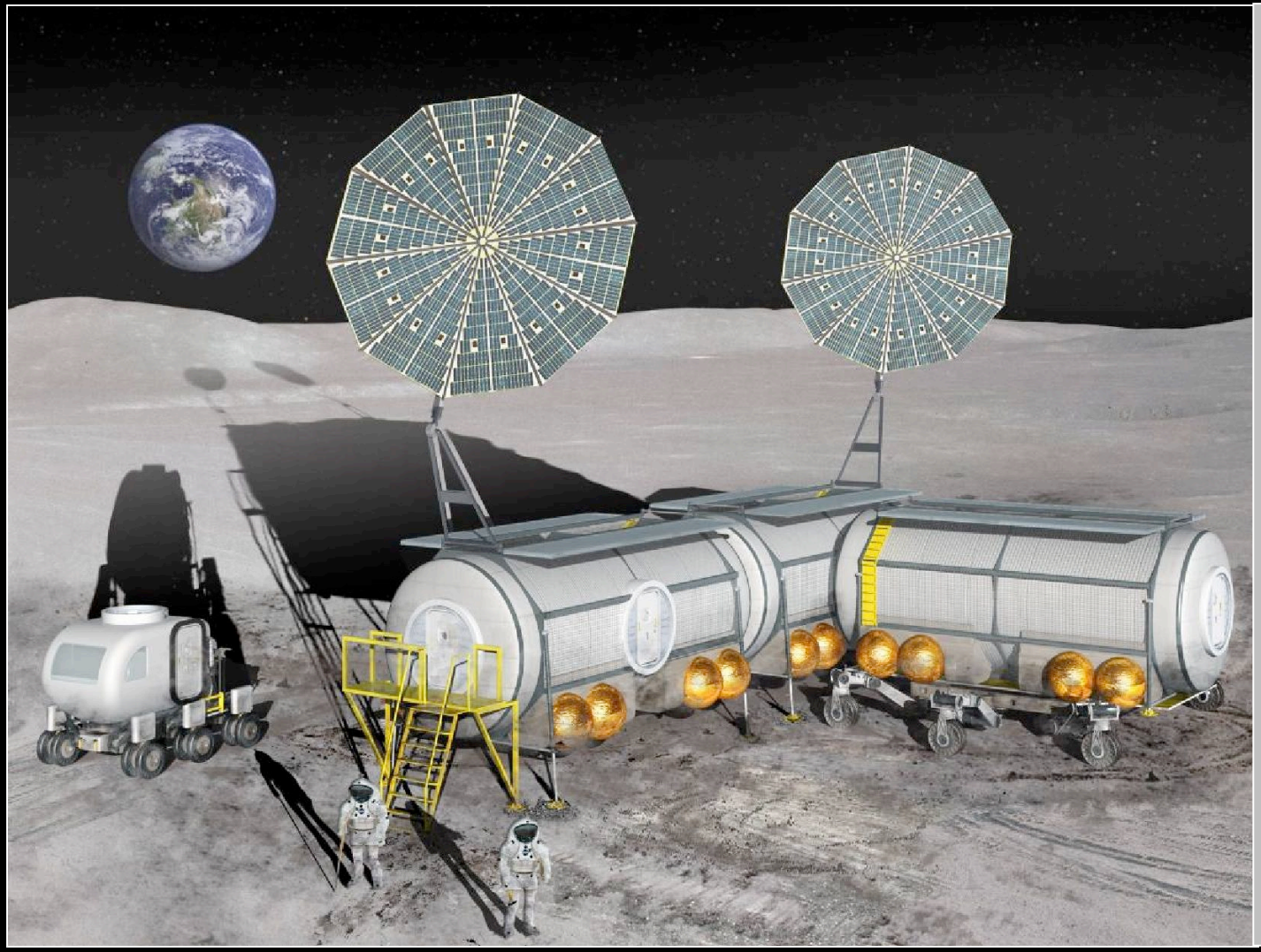
Human Research Program

Exploration Tech. Development Program

Commercial Crew Cargo Program

Constellation Program

Key Elements of a Lunar Outpost



Lander and Ascent vehicle

Extravehicular Activities (EVA)

Power

Habitation

Mobility

Navigation and Communication

In-Situ Resource Utilization (ISRU)

Lunar Surface Mobility Systems

"Chariot" is a six-wheeled lunar rover chassis that could be used to transport crew or equipment.

A small pressurized rover will allow the crew to explore up to 200 kilometers away from the lunar outpost.

ATHLETE is a six-legged rover that could be used to transport heavy payloads such as habitat modules during construction of the lunar outpost.

In-Situ Resource Utilization

Proof-of-concept unit for producing oxygen from lunar regolith

"Scarab" rover with sampling drill to prospect for subsurface ice in lunar craters

- In-situ resource utilization (ISRU) will enable a sustainable lunar outpost by reducing the mass of consumables that must be supplied from Earth.
- NASA is developing prototype systems to prospect for lunar resources, to excavate lunar regolith (soil), and to process regolith to produce oxygen, water, and rocket propellants.
- The "Scarab" rover and its onboard ISRU system will be field tested in Hawaii in November, 2008 to demonstrate production of oxygen from simulated lunar regolith.

ANALOGS FOR LUNAR AND MARS EXPLORATION

Desert Research and Technology Studies (Desert RATS) - Flagstaff, Arizona

Moses Lake, Washington

NASA Extreme Environment Mission Operations (NEEMO) - Key Largo, Florida

Haughton Mars Project (HMP) - Devon Island, Canada

PISCES, Mauna Kea, Hawaii

McMurdo Station, Antarctica

Current NASA Exploration Activities in Hawaii

- Volcanic rock from Big Island used to produce JSC-1 lunar simulant
  - Lunar simulant duplicates chemical and physical properties of lunar soil for testing lunar surface systems.

- Conducted field geology trip to Kilauea on August 12-15 to familiarize NASA managers and scientists with field operations in lunar-like setting.

- Japan - U. S. Science, Technology, and Space Applications Program (JUSTSAP) symposium to be held in Waikoloa Beach on November 9-14, 2008.

- PISCES analogue site at Mauna Kea will host field test of NASA In-Situ Resource Utilization (ISRU) and robotic prospecting systems in November 2008.
  - Canadian and German space agencies participating.